# SHORT COMMUNICATIONS

## THE WESTERN PORT EARTHQUAKE OF 6TH JULY 1971

An earthquake occurred in the region of Western-port Bay at approximately 8 a.m. Australian E.S.T. on 7 July 1971 (6 July, G.M.T.). It was felt throughout the Melbourne area, a major part of West Gippsland, and reports were received from 136 km away. The strength of the shock was such that only the initial arrival was recorded accurately on the Toolangi seismograph. In all, nineteen seismograph stations throughout Australia recorded the earthquake but only those within approximately 600 km exhibited clear S-wave arrivals. Damage resulting from the quake was minor and no injuries were reported.

The National Oceanographic and Atmospheric Administration (NOAA) determined the epicentre to be at 38·5°S., 145·3°E., origin time 21h 55m 01·3s (G.M.T.), using reports from 10 stations. Other epicentre determinations were:

(i) 38·5°S., 145·1°E., time 21h 54m 57·9s by the Bureau of Mineral Resources (BMR), Canberra, using 16 stations.

(ii) 38·44°S., 145·1°E., time 21h 54m 58·9s by G. M. Gibson, University of Melbourne, using 19 stations.

An approximate estimate of the magnitude was made according to the method for local shocks outlined by Richter (1958), and revealed a surface wave magnitude of close to 5, from the Canberra seismograph records.

Immediately after the earthquake, questionnaires seeking information on felt intensity were distributed throughout Central Victoria and residents near the epicentre were interviewed. About 150 reports were collected for analysis and a similar number collected by the BMR were also studied.

From the reports, an isoseismal map was drawn (Fig. 1) indicating that the tremor was perceivable over an area of approximately 160 km radius.

The shape of the isoseismals is fairly well defined, but more details of response in the Bellarine Peninsula and La Trobe Valley areas would be useful in studying the relationships between the configuration of faults and the attenuation of earthquake energy as revealed by the isoseismals. The extension of the intensity pattern parallel to the Tyabb and Selwyn Faults indicates that the seismic energy is least attenuated parallel to the fault lines, a trend revealed in previous earthquakes and elsewhere (e.g. Hills 1959, Wilkie 1970).

The plotting of tremor durations on a geological map of the Melbourne area indicated a trend to longer durations of shaking, but not necessarily higher intensities, in suburbs based on sediments.

It is of interest to note that on the day of the earthquake the Moon was full and had significant southerly declination, and was over the Eastern Pacific Ocean. It appears (Bishop 1971) that an increase in earthquake frequency occurs generally for times when the Moon is over this region.

The difference in the epicentre determinations are confined largely to the longitude values, which is probably a reflection of the scarcity of seismic observatories to the east and west of the epicentre. The isoseismal pattern suggests that the epicentre was close to the position 38·4°S., 145·2°E.

Blake (1941) has shown how the focal depth can be estimated from the isoseismal radii. The isoseismals for this earthquake are irregular in shape and the method is therefore limited in accuracy. However, values found using the III, IV and V intensity lines indicate a depth in the range 17-20 km. The depth estimates determined from the seismograph records were: 0-17 km by the BMR, and 19-27 km by G. M. Gibson, suggesting a depth of about 20 km.

An estimate can also be made of the magnitude (Karnik 1961), using the maximum isoseismal intensity and the depth of focus. This method gave a magnitude of 5 for a maximum intensity of VI and a depth of 20 km.

For the provision of data, thanks are due to representatives of the BMR in Canberra, Melbourne, Port Moresby and Mundaring; also to A.N.U., University of Adelaide, Riverview College and University of Tasmania. We are further indebted to many people throughout Victoria who responded to our questionnaire.

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I. D. Bishop
*c/o Bureau of Mineral Resources, Geology & Geophysics, P.O. Box 378, Canberra City, ACT 2601*

L. A. Cresswell
*School of Geology, University of Melbourne, Parkville, Victoria 3052*

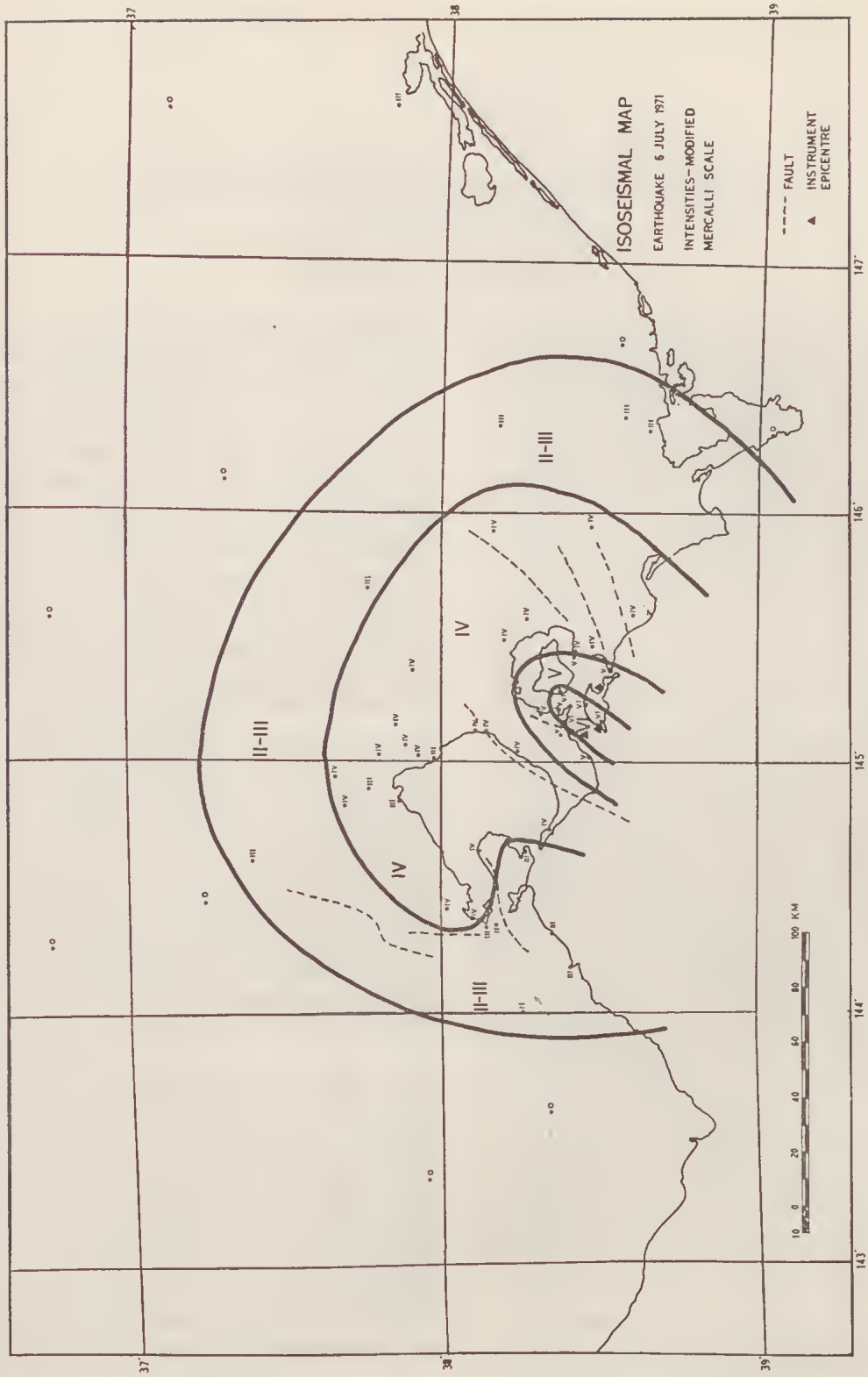
ISOSEISMAL MAP
EARTHQUAKE 6 JULY 1971
INTENSITIES – MODIFIED MERCALLI SCALE
FAULT
INSTRUMENT EPICENTRE
II–III
IV
V
100 KM

FIG. 1